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CONTENTS

IMPACT OF SMALLHOLDER IRRIGATION IN ZIMBABWE

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INTRODUCTION

Assessing the impact of irrigation is complex and multi-facetted, and, often, value-judgements make a difference in approach and result of analysis. In this paper, I shall argue that the case of smallholder irrigation in Zimbabwe is no exception. In fact, one needs to put smallholder irrigation in its proper context with regards to its past, present and future role in the national economy.

A number of studies have dealt with the political economy of smallholder irrigation (Roder 1965, Rukuni 1984 and 1986, Mudekunye 1979). The general observation is that irrigation investments in communal areas were regarded by subsequent colonial governments as one of few productive public investments (such as roads and bridges) provided for these dry, drought-prone, government neglected parking lots for native Zimbabweans. In an attempt to enhance food security and settle displaced blacks (Roder 1965), a conventional cost-benefit analysis hardly asks nor answers all the rights questions.

Even today, the study by SADC (1992) is, in my judgement an example of how not to evaluate the impact of smallholder irrigation in Zimbabwe. As an important planning study for the SADCs Food Security Programme (Project 1.0.12) the report hardly addresses the role of smallholder irrigation in food security. Instead, a conventional budgeting approach is used to argue for abolition of public expenditure in smallholder irrigation, with further expansion recommended for, of course, the large scale commercial sector.

A FRAMEWORK FOR ANALYSIS AND DATA NEEDS

The ideal approach to impact assessment of smallholder irrigation in Zimbabwe is one that would assess what the situation would be "without" the irrigation investment. In addition, one would have to examine what the alternatives are, and what the constraints are. A comprehensive assessment should determine the impact of irrigation on incomes and food security. In addition, backward and forward commercial and economic linkages have to be studied. Finally the social impact, particularly employment, human capital developments, health, equity and environmental sustanability have to be accounted for. Because the UZ/Agritex/IFPRI study was focussed at the system level of analysis, data is not complete for the framework proposed here. The paper, however, proceeds to discuss the key issues of impact and provides a limited analysis and derives some conclusions and recommendations.

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RESULTS OF FINANCIAL VIABILITY OF FARMS AND SCHEMES

Farm Level Viability Results

Farm level financial viability is measured here in terms of household income. Net income from irrigation is approximated by the total of summer and winter gross margins (Table 7.1). On average, farmers on Agritex and community schemes are making a profit ranging from about $1,300/ha to $4,300/ha. In 1991, on average, farmers on community schemes are obtaining higher net incomes than those in Agritex systems. These profit margins are consistent with the yields reported in Chapter 5. With gross margins at corresponding dryland sample sites in the same season averaging about $120/ha it can be concluded that farmers on irrigation are on average, achieving higher returns per unit land that the average on dryland in corresponding areas. Garden systems achieve the highest gross margins per ha, averaging above $5,000 across sample sites.

When financial returns are estimated per household, Agritex, and Community Schemes are averaged about $727 compared to about $650 on garden sites (Table 7.2). In many cases this was in addition to dryland cultivation. The average for corresponding dryland sites was just about $200 per household in the same year. Smallholder irrigators are therefore achieving higher incomes on average than those on dryland in corresponding areas.

Scheme Level Financial Viability Results

Scheme level financial viability or profitability is estimated in terms of excess of total farm profit over cost of operation and maintenance (O&M). Tables 7.3 and 7.4 show total and per ha. respectively of O&M cost on Agritex and Community Schemes. In 1990/91, therefore, the majority of the sample schemes are estimated to have produced excess income. These include: Mkoba, Mwerahari/Sachipiri, Mabodza, Mutambara, Chakohwa and Tawona. The problem cases which made a loss are Charandura, Mondi Mataga, Senkwazi and Chibuwe. Agritex charges are at a nominal rate of $145/ha for O&M expenses. This figures has no bearing on actual costs as shown in Tables 7.3 and 7.4. Actual O&M costs are much lower on community schemes. The average O&M costs for Agritex and Community Schemes was $720/ha.

In conclusion, Agritex and Community schemes are quite viable, achieving average profit of about $2,000/ha. per annum while averaging $720/ha per annum in operation and maintenance costs towards which farmers contribute $145/ha/annum, with the balance subsidized by government.

Economic Performance

While financial analysis estimates profitability from a private standpoint, economic analysis estimates the value of irrigation to the economy at large. To do this financial analysis is transformed through the following steps:

- account for transfer payments (taxes, subsidies, water rent, *etc*);
- adjust for efficiency prices of costs and benefits (shadow pricing);
- account for intangible costs and benefits; and,
- adjust interests rates to reflect social time preference rates.

Tangible Costs and Benefits

In the case of Agritex and Community schemes, the following adjustments are therefore necessary for tangible costs and benefits:

- Deduct from the cost of farm inputs all state taxes (sales and import duties, etc) and deduct all taxes from O&M expenses. The data required to perform these deductions were not readily available for this analysis. It is estimated, however, that deductions from variable costs of farm production would be 15 percent at a minimum, and because of similar deductions (including income tax for staff) at scheme level, O&M costs would drop by at least 15 percent;

- Adjusting for efficiency prices of goods and services allows the analyst to estimate social costs or opportunity cost. This is necessary because goods and services provided by the manufacturing and industrial sector are often produced under imperfect competition or worse still by monopolies. Prices of such goods and services are generally higher than opportunity cost. Prices of farm produce may also be over-priced or under-priced. Where regulations determine farm-gate prices, these have to be adjusted for. And where local currency is overvalued, then corresponding adjustment have to be made for border prices. In the case of Zimbabwe the above consideration would probably amount to about 30 percent gross taxation of irrigation incomes (Eicher and Rukuni 1993).

Intangible Costs and Benefits

Intangible benefits of smallholder irrigation have been observed in the following areas:

Irrigation is associated with human capital development in communal areas (Table 7.5 and 7.6).

Irrigation has some backward and forward linkages with the non-farm sector, particularly through employment generation (Table 7.7);

- Smallholder irrigation contributes to household food security (Table 7.8 and 7.9).

Intangible costs of smallholder irrigation have been observed in the following areas:

- Water-born diseases;

- Environmental damage.

Adjusting for Social Time Preference Rates

Interest rates prevailing on the market basically estimate the time value of money for private investments. In Zimbabwe, as universally experienced, market rates of interest are higher than the prevailing social time preference rates. The social time preference rate is the time value of money from society's standpoint. This is the rate at which society is willing to forego consumption today, in preference for consumption in the future, including future generations, through investment today. Social time preference rates are much lower for public investments than private, particularly in relation to infrastructural development in communal areas (dams, irrigation systems, rural roads, electricity, telecommunication and so on). This rate is normally a single digit figure.

Capital Costs

For existing irrigation schemes that are in the sample, capital costs are treated as sunk costs. The cost estimates for future schemes are, however, important in economic analysis. Data on sunk costs is unavailable. Estimates of current and future costs also vary widely. The SADC (1992) reports cites differences of 300 percent between Halcrow Zimbabwe (1990) estimates and FAO (1990) estimates. For smallholder schemes in 1991 this would translate to a range as follows:

- $6,500 to $20,100/ha for capital works to field edge
- $6,000 to $19,320 for infield works.

In this paper, the issue of capital investments is dealt with in the following manner:

- Treat as sunk costs for existing sample scheme;
- Use farm and scheme level incremental net benefits (profit and other weighted benefits) to discount for present values of capital investments that would be covered by the benefits.

PRELIMINARY FINDINGS

Given the framework explained above, it will be possible to derive economic incremental benefits at scheme and aggregate level. For this paper however, preliminary estimates have been derived on the average cost and benefit figures. After adjusting for transfer payments and shadow prices the average O&M costs are reduced from average of $720 by a conservative factor of 15 percent to $612.

On the benefit side, adjustment for shadow prices has not been done. The following social costs and benefits were estimated:

- a 15 percent increase in employment;
- a 20 percent increase in human capital development;
- a food security improvement of 20% households on schemes as well as at least an additional 50 percent household supplying deficit farming; and
- a health penalty of five percent of extra population suffering from water borne diseases.

Whilst it is difficult to weight these benefits, a conservative weighing of at least 20 percent is due. This raises average benefits per ha. of Agritex and community schemes by a factor of 0.2. In conclusion, these irrigation schemes have a positive impact on the local and national economy with the economic return higher than the financial return.

CONCLUSIONS

Smallholder irrigation in communal areas has always been a problematic area for Zimbabwe governments. Part of the problem, in my judgment, is the absence of an appropriate analytical framework, along with the absence of data, necessary to determine and plan for the best alternative investments. Initial data analysis and findings of the UZ/Agritex/IFPRI study demonstrate some of the existing and potential pay-offs in terms of increased yield, incomes, and other benefits: food security and nutrition, human capital development, and employment. The goverment of Zimbabwe is therefore urged to develop a comprehensive irrigation policy which clearly spells out the role of smallholder irrigation and strategy to increase investment in this sector.

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